

FINAL TECHNICAL REPORT

ONR Grant #N00014-90-J-1118

Robert Holman

Sand Bar Morphology As A Nonlinear Dynamical System

The focus of this grant has been on the statistics and dynamics of nearshore fluid motions and on aspects of the sediment response of natural beaches. Progress has been achieved through a combination of theoretical work and extensive sampling programs. We have learned about the dynamics of low frequency edge waves over strong longshore currents as well as hypothesizing a new mechanism for the providing energy for these and other low frequency nearshore motions. These theoretical predictions have been coupled with and tested against some excellent data sets (part of the Duck series of field experiments) and the statistics of wave energy of surf zone incident waves, infragravity waves, shear waves and swash have been characterized for the single-barred topography of Duck. The relative importance of different frequency bands seems to vary systematically over different coastal sites, primarily depending on a dynamically-defined beach steepness.

In addition, we have begun a systematic study of the large scale behavior of various nearshore sites with the development and deployment of Argus stations, remote unmanned video image processing stations that provide regular measurements of beach response at seven coastal sites around the world. These data have helped us constrain (or more specifically, to remove old incorrect intuitive constraints) the types of variability exhibited by beach systems with different environmental parameters. Interannual variability has been shown to be much different from previous expectations. The Argus program continues to grow and appears ready for transition to more applied labs of the Naval Forces.

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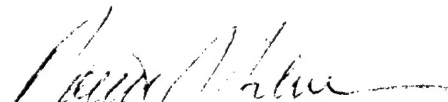
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LIST OF PUBLICATIONS

- Howd, P.A., J. Oltman-Shay and R.A. Holman. Wave variance partitioning in the trough of a barred beach, *J. Geophys. Res.*, 96(C7), 12,781-12,795, 1991.
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